

# CLASSIFICATION OF PROSPECTIVE STUDENTS WHO ARE ELIGIBLE TO RECEIVE KIP MERDEKA LECTURE USING THE CART ALGORITMA APPROACH

Efori Bu'ulolo <sup>1\*</sup>

Alwin Fau <sup>2</sup>

Eferoni Ndruru <sup>3</sup>

Fince Tinus Waruwu <sup>4</sup>

<sup>1</sup> Budi Darma University, buuloloefori21@gmail.com

\*Corresponding author

<sup>2</sup> Budi Darma University, alwinfau@gmail.com

<sup>3</sup> Budi Darma University, Ronindruru@gmail.com

<sup>4</sup> Budi Darma University, fincedav@gmail.com

## Article history

**Received date** : 11-6-2023

**Revised date** : 12-6-2023

**Accepted date** : 25-7-2023

**Published date** : 15-8-2023

## To cite this document:

Bu'ulolo, E., Fau, A., Ndruru, E., & Waruwu, F. T. (2023). Classification of prospective students who are eligible to receive KIP Merdeka lecture using the cart algoritma approach. *Journal of islamic, social, economics and development (JISED)*, 8 (55), 451 – 457.

**Abstract:** *To help prospective students who have academic potential but have economic limitations, the government through the Ministry of Education, Culture, Research and Technology of the Republic of Indonesia has programs namely the Smart Indonesia Program (PIP), one of which is KIP Lecture Merdeka. Every year Budi Darma University gets an allocation of KIP Lecture quotas from the Higher Education Service Institute (LLDikti) region I North Sumatra, in the process of determining prospective students who are eligible to receive KIP Lectures Merdeka Budi Darma University often experiences difficulties because the quota is very limited and also prospective students who there are a lot of people who want to go to college with the Merdeka Lecture KIP pathway. For this reason, a technique is needed in classifying KIP selection data for previous lectures, the aim is to assist the management of the Merdeka Lecture KIP at Budi Darma University in making a decision on a name that is truly worthy of receiving the Merdeka Lecture KIP. One of the classification techniques in data mining is the cart algorithm. The cart algorithm classifies the previous Lecture KIP selection data based on criteria variables and is associated with data labels. The results of the classification are prospective students who do not have a Prosperous Family Card (KKS) and are not accepted and prospective students who do have a KKS, their acceptance status as a student on the Merdeka Lecture KIP pathway must be based on exam results, if the exam results are low then they are not accepted and if the exam results are medium and high then accepted. One of the classification techniques in data mining is the cart algorithm. The cart algorithm classifies the previous Lecture KIP selection data based on criteria variables and is associated with data labels. The results of the classification are prospective students who do not have a Prosperous Family Card (KKS) and are not accepted and prospective students who do have a KKS, their acceptance status as a student on the Merdeka Lecture KIP pathway must be based on exam results, if the exam results are low then they are not accepted and if the exam results are medium and high then accepted. One of the classification techniques in data mining is the*

*cart algorithm. The cart algorithm classifies the previous Lecture KIP selection data based on criteria variables and is associated with data labels. The results of the classification are prospective students who do not have a Prosperous Family Card (KKS) and are not accepted and prospective students who do have a KKS, their acceptance status as a student on the Merdeka Lecture KIP pathway must be based on exam results, if the exam results are low then they are not accepted and if the exam results are medium and high then accepted.*

**Keywords:** *Students, KIP Kuliah, Cart Algorithm.Faith.*

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## **Introduction**

KIP Lecture Merdeka is educational assistance given to students who have good academic potential but have economic limitations. KIP Lectures Merdeka is part of the Smart Indonesia Program (PIP) and is a continuation of the KIP Lectures and Bidikmisi programs. KIP Lecture Merdeka helps students by providing tuition fees and living expenses in accordance with the living expenses of the city where students live(Puslapdik, 2022).

Budi Darma University is one of the tertiary institutions in the LLDikti Region I North Sumatra which is located at Jl. Sisingamangaraja No. 338 Medan City. Every year, Budi Darma University gets an allocation of KIP Merdeka Lecture quota from LLDikti Region I, North Sumatra, then Budi Darma University manages the quota by conducting independent selection of prospective students who receive KIP Merdeka Lectures who have registered through the KIP Merdeka Lecture system.

The problem that is often faced by Budi Darma University is the difficulty in deciding who really deserves to receive KIP Merdeka Lectures, because the quota is very limited and the number of prospective students is very large. Therefore, a technique is really needed for classifying prospective students who are eligible to receive KIP Merdeka Lectures with the aim of assisting in determining who is truly eligible to receive KIP Merdeka Lectures.

One solution to the above problem is to utilize the previous Lecture KIP management data and explore it with the cart algorithm. One of the classification techniques in data mining is the cart algorithm(Siregar, Alan Bangun;Buulolo, Efori;Ginting, 2017). The cart algorithm (Classification and Regression Tree) is a data exploration technique and the exploration results are represented in the form of a decision tree.(Amin, 2016)(Savitri, 2022).

Based on research conducted by Agustrika Aribowo et al in 2021 with the title implementation of the cart algorithm in determining eligibility for recipients of PKH assistance in Ngadirejo village. The background of this research is that the process of determining PKH beneficiaries in Ngadirejo village has so far been carried out by means of deliberations between the village administration and community shops, many things are considered to be less than optimal in obtaining information. Therefore, a cart algorithm is needed to assist the Ngadirejo village government in obtaining information about PKH beneficiaries. The results of this study are that the cart algorithm can classify the determination of PKH assistance in Ngadirejo village with three classifications, namely feasible, considered and not feasible.(Aribowo et al., 2021). Research conducted by Eti Yonika Sri Ritno in 2019 examined the implementation of the cart algorithm in the family economic classification in the kelambir trading village Tg. Morawa. The background of this research is that it is difficult for village office employees to obtain data on residents who are entitled to assistance such as raskin or BLT(Ritno, 2019). For this reason,

a cart algorithm is needed for the economic classification of families that are eligible for government assistance. Research conducted by Irmayani in 2020 conducted research related to the application of the cart algorithm for the economic classification of the Amessangeng sub-district community, the results of the study were that the cart algorithm was able to classify socio-economic data for the Amessangeng sub-district community so that it could assist in distributing aid appropriately (Irmayani, 2020).

## Literature Review

The steps taken in this research from start to finish are:

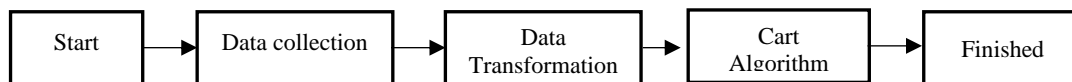


Figure 1: Research Methods

### Data Collection

In this study, the data collection stage is very important. The researcher collected data on the Budi Darma University KIP Lecture management team, and the data collected was KIP Lecture selection data for 2021 and below with variables namely subject variables namely number and name, criteria variables namely achievement, exam results, total parental income, having KKS and the status of home ownership as well as the decision/class variables, namely information.

### Data Transformation

After the data is collected, data transformation is performed. The data needed by the cart algorithm is data in the form of categories, then data in numerical form is converted into categories. In this study, data on test results and total parental income were converted into categories (Efori, 2020).

### Cart Algorithm

Furthermore, the data that is ready to use is classified using the cart algorithm with the aim of obtaining a decision tree. To form a decision tree, the following steps are carried out:

- For iteration 1, compiling root candidates, compiling is done on all criteria variables
- For iteration 2 and so on, preparing branch candidates is carried out on all criteria variables except for the criteria variable that has become the root

c. Determines the left/left and right/right values of the criteria variable values

d. Determining  $P_l$  and  $P_r$  values:

$$P_l = \frac{\text{jumlah catatan pada cabang kiri}}{\text{jumlah data training}} \quad (1)$$

$$P_r = \frac{\text{jumlah catatan pada cabang kanan}}{\text{jumlah data training}} \quad (2)$$

e. Calculating the value of  $P(j|t_l)$  and  $P(j|t_r)$  through an equation based on

$$P(j|t_l) = \frac{\text{jumlah catatan berkategori } j \text{ pada cabang kiri}}{\text{jumlah catatan pada data training}} \quad (3)$$

$$P(j|t_r) = \frac{\text{jumlah catatan berkategori } j \text{ pada cabang kanan}}{\text{jumlah catatan pada data training}} \quad (4)$$

f. Calculating the value of  $Q(s|t)$

$$Q(s|t) = \sum_{j=1}^{\text{jumlah kategori}} |P(j|t_l) - P(j|t_r)| \quad (5)$$

g. Calculating the suitability value

$$\phi(s|t) = 2P_l P_r Q(s|t) \quad (6)$$

- h. Comparing the calculated values  $\emptyset(s|t)$
- i. The highest value will be the root/branch  $\emptyset(s|t)$

The value of the criterion variable which is the root/branch, is sought for its class whether it has made a decision or not. If the class already has a decision then the process stops and if there is a class that does not have a decision then it will continue with the next iteration (Indah Prabawati et al., 2019) (Monalisa & Hadi, 2020) (Octavianity, 2019).

## Result And Discussion

### Discussion

The data used is the previous Lecture KIP selection data, and the data is as follows:

**Table 2: KIP Selection Data for 2021 and below**

No	Name	School Achievement	Exam results	Total Income of Parents	Have KKS	Home Ownership Status	Information
1	Name 1	Yes	78	2.8 Mt	No	Family	No
2	Name 2	No	40	2.1 Mt	There is	Family	No
3	Name 3	No	75	1.1 Mt	There is	Family	Accepted
4	Name 4	No	95	1.5 Mt	There is	Family	Accepted
5	Name 5	There is	80	2.2 Mt	There is	Family	Accepted
6	Name 6	No	58	2.5 Mt	No	hitchhiking	No
7	Name 7	No	70	2.6 Mt	No	Family	No
8	Name 8	No	92	1.8 Mt	There is	Family	Accepted
9	Name 9	No	47	1.7 Mt	There is	Family	No
10	Name 10	No	59	2.9 Mt	No	hitchhiking	No
11	Name 11	No	88	3.8 Mt	No	Family	No
12	Name 12	No	87	3.9 Mt	No	Family	No
13	Name 13	Yes	55	3.5 million	There is	Annual Rent	No
14	Name 14	No	75	2.5 Mt	No	Family	No
15	Name 15	Yes	77	2.2 Mt	There is	Annual Rent	Accepted
16	Name 16	Yes	50	2.3 Mt	No	Family	No
17	Name 17	Yes	91	2.0 Mt	There is	Family	Accepted
18	Name 18	Yes	80	2.5 Mt	There is	Family	Accepted
19	Name 19	No	45	1.2 Mt	No	Family	No
20	Name 20	No	60	2.9 Mt	No	Rent	No
21	Name 21	No	65	3.1 Mt	No	Family	No
22	Name 22	No	80	3.4 Mt	No	Family	No

The data needed in the cart algorithm is data in the form of categories, therefore the data in numerical form must be converted into categories, namely the variable criteria for exam results and the total amount of parents' income.

**Table 3: Test Score Categories**

Exam results	Category
<60	Low
60 to 80	Currently
>80	Tall

**Table 4: Categories of Parents' Total Income**

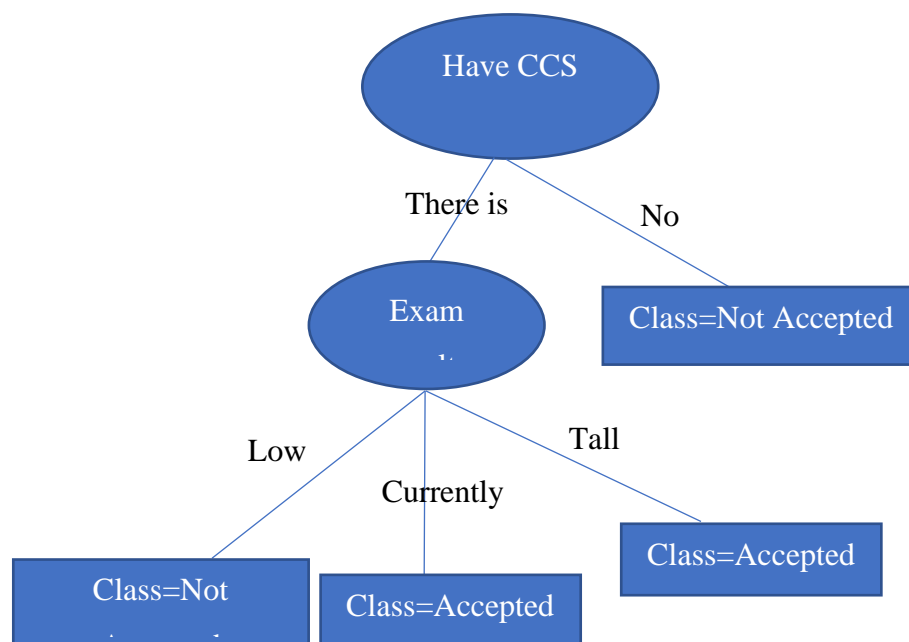
Total Income of Parents	Category
Under or equal to 2 million	$\leq 2$ Mt
Above 2 Mt	$> 2$ Mt

After the variable criteria for exam results and total parental income in numerical form have been changed in the form of categories, the table changes as follows:

**Table 5: KIP Selection Data for 2021 and below after being categorized**

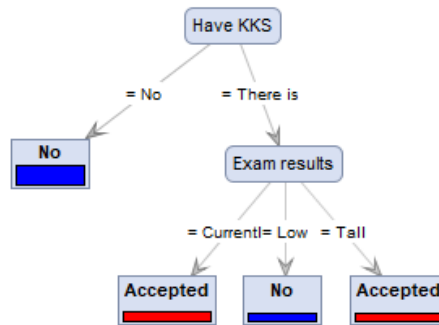
No	Name	School Achievement	Exam results	Total Income of Parents	Have KKS	Home Ownership Status	Information
1	Name 1	Yes	Currently	>2 Mt	No	Family	No
2	Name 2	No	Low	>2 Mt	There is	Family	No
3	Name 3	No	Currently	<=2 Mt	There is	Family	Accepted
4	Name 4	No	Tall	<=2 Mt	There is	Family	Accepted
5	Name 5	There is	Currently	>2 Mt	There is	Family	Accepted
6	Name 6	No	Low	>2 Mt	No	hitchhiking	No
7	Name 7	No	Currently	>2 Mt	No	Family	No
8	Name 8	No	Tall	<=2 Mt	There is	Family	Accepted
9	Name 9	No	Low	<=2 Mt	There is	Family	No
10	Name 10	No	Low	>2 Mt	No	hitchhiking	No
11	Name 11	No	Tall	>2 Mt	No	Family	No
12	Name 12	No	Tall	>2 Mt	No	Family	No
13	Name 13	Yes	Low	>2 Mt	There is	Annual Rent	No
14	Name 14	No	Currently	>2 Mt	No	Family	No
15	Name 15	Yes	Currently	>2 Mt	There is	Annual Rent	Accepted
16	Name 16	Yes	Low	>2 Mt	No	Family	No
17	Name 17	Yes	Tall	<=2 Mt	There is	Family	Accepted
18	Name 18	Yes	Currently	>2 Mt	There is	Family	Accepted
19	Name 19	No	Low	<=2 Mt	No	Family	No
20	Name 20	No	Currently	>2 Mt	No	Rent	No
21	Name 21	No	Currently	>2 Mt	No	Family	No
22	Name 22	No	Currently	>2 Mt	No	Family	No

Table 4 data is processed with the cart algorithm, so a decision tree is obtained as shown in Figure 2 below:



**Figure 6: Decision Tree**

The initial root node in the decision tree above is the criterion variable having KKS because in the process of forming the decision tree it obtains the highest final result compared to the other criteria variables, and in the process of forming the branch of the criterion variable the highest end result is the test result. Furthermore, with the same data a test was carried out with the Rapidminer application to test the results of the manual calculation of the cart algorithm and the calculation results as shown in Figure 3 below:



**Figure 7: Decision Tree with the Rapidminer Application**

The decision tree generated from the Rapidminer application has the same results as the manual calculation of the cart algorithm, so the resulting decision tree has very high validation. The rule generated from the decision tree above is:

- a) If prospective students do not have a Family Welfare Card (KKS) then they will not be accepted
- b) If a prospective student has a Family Welfare Card (KKS) and the test results are low, they are not accepted
- c) If the prospective student has a Prosperous Family Card (KKS) and the test results are moderate, then they are accepted
- d) If the prospective student has a Family Welfare Card (KKS) and the test results are high, then they are accepted.

## Conclusion

The conclusion obtained from the results of this study is that the cart algorithm can classify prospective students who are eligible to be accepted as KIP Lecturers Merdeka students at Budi Darma University by using the previous KIP Lecture selection data. Prospective students who do not have a Prosperous Family Card (KKS) are not accepted as students through the Merdeka College KIP pathway and prospective students who have a Prosperous Family Card (KKS), the status of being accepted as a student through the Merdeka College KIP pathway is determined through the results of an independent exam held by Budi University Dharma.

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